



Enabling and Sustaining Connected Communities Rooted in Solving Societal Challenges

EXECUTIVE SUMMARY

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Introduction

Less than ten years ago, the promise of smart cities seemed ripe with opportunities to improve quality of life through technologies like cameras and Internet of Things (IoT) devices with a layer of artificial intelligence (AI) behind them to streamline and optimize operations. Since that time, the shine has worn off and the framing of these issues has also shifted from smart cities to connected communities, as the integration of intelligent technologies is not limited to just cities, but can be used in rural, tribal and remote areas as well. Connected communities technology projects often do not go past the pilot stage; are application and context specific; are not implemented at scale; do not explicitly integrate community input during design, planning or operation; and largely consist of isolated platforms or systems of operation without integration.

To better understand and address these issues, the National Science Foundation (NSF) funded Carnegie Mellon University's Metro21: Smart Cities Institute (Metro21) to host a workshop entitled *Enabling and Sustaining Connected Communities Rooted in Solving Societal Challenges*. The in-person workshop and pre-workshop virtual listening sessions were designed to elicit feedback and suggestions from experts in academia, government, nonprofits, civic organizations, and industry to identify solutions to the significant technical, policy, and socioeconomic challenges to integration and scaling of connected communities technologies. We heard from experts in the following domains: mobility/transportation, energy, climate resilience, ecosystem services and multiple applications. The resultant solutions and suggestions are summarized in the following report. Findings are based on discussions from the two-day workshop, five pre-workshop listening sessions, and three surveys.

WORKSHOP FINDINGS

Workshop input largely applied to three critical roles in connected communities projects:

1. **National Science Foundation** and other funders
2. **Academia** and other research and technology experts, and
3. **Local governments** and other community organizations

We therefore organized input directed to each of these roles. Inputs can largely be categorized under three impact areas:

1. **Putting communities in the lead:** There is a need to better align technology with community needs. This could be addressed by investing in early partnerships between researchers and communities, especially local governments. To support this activity, it's important to have dedicated staff at local governments and universities to facilitate partnerships. It is especially important for communities to be involved in proposing and selecting projects. Guidelines and best practice documents can be created to inform researcher-community partnerships, as well as the inclusion of human-centered design principles to ensure solutions were useful for communities.
2. **Sustaining Innovations:** There are several challenges to sustaining technology deployments beyond initial pilot projects. Funders, researchers, and community partners can invest in evaluating the effectiveness of technologies and improving technical skills and capacity in community organizations to sustain and expand technology deployments.
3. **Integrating and Scaling Successful Technologies in New Communities:** Communities want more (and unbiased) information about technologies that have been tested elsewhere to make decisions about which ones to integrate into their own communities. Building and actively disseminating evidence about the effectiveness of technologies under different circumstances is key to helping communities make informed decisions about which technologies to adopt and thereby scale their impact.

Below, we outline the potential solutions in tables organized by audience/roles (described further in the Workshop Findings section of this report).

PUTTING COMMUNITIES IN THE LEAD

National Science Foundation

1. Compensate researchers, local governments, and community members for early partnership-building and scoping work.
2. Incentivize plans detailing how researchers will work with communities in grant proposals.
3. Fund intermediary facilitators at universities and local governments who can help organize and manage continuous partnerships.
4. Create opportunities for communities to propose problems and set success metrics.
5. Connect communities with researchers doing work that is relevant to their needs.
6. Support the creation of regional innovation plans.
7. Include non-academics in grant review panels.
8. Incentivize multidisciplinary research into connected communities, including social scientists and human-centered design.
9. Provide funding and guidelines to improve communication and trust in communities.
10. Establish guidelines and best practices for connected communities projects.
11. Coordinate with other government agencies to address pressing community needs and amplify efforts.

Academia

1. Build and maintain trusting partnerships.
2. Hire staff to facilitate and sustain trusting community partnerships.
3. Streamline processes for community partnerships.
4. Support grant writing in all departments.
5. Prioritize diversity, equity, inclusion, and accessibility.
6. Compensate community members and government employees for participating in partnerships.
7. Create multidisciplinary teams, including human-centered design and social scientists.
8. Incentivize and reward researchers who invest their time and effort into research with community partners.
9. Create multidisciplinary spaces for connected communities research.
10. Adjust overhead requirements for grants funding community partnerships.

Local Governments

1. Create staff roles that facilitate sustained partnerships with universities.
2. Streamline processes for partnering with universities.
3. Improve contracts with third-party vendors, ensuring data sharing.
4. Ensure equitable and inclusive community involvement.

SUSTAINING INNOVATIONS

National Science Foundation

1. Fund evaluations of connected communities technology.
2. Fund transition of research pilots to integration and scale.
3. Incentivize evaluation and sustainability plans in grant proposals.
4. Support research into technical skills and capacity that community partners need to sustain, integrate, and scale technologies.
5. Fund training programs for technical skills and capacity of community partners.

Academia

1. Research, develop, and offer training programs to increase institutional capacity of community organizations and municipal governments.
2. Research and develop legal and policy guidelines for successful technology deployments.

Local Governments

1. Identify and invest in areas necessary to sustain and scale connected communities technology.
2. Update laws and policies to support new technologies.
3. Actively foster a culture that is open to data and innovation.
4. Work with private entities to align their interests with innovation.

INTEGRATING AND SCALING SUCCESSFUL TECHNOLOGIES IN NEW COMMUNITIES

National Science Foundation

1. Create a public portal where people can learn about the results of NSF-funded projects.
2. Support research into the factors that impact technology's success, including meta-analyses and comparative studies.
3. Support research into organizational behavior.
4. Support research into particularly challenging contexts.
5. Fund development of conferences and journals where researchers can present and publish social impact research.
6. Support networks and events that connect communities with technology solutions.

Academia

1. Publicize applied research.
2. Publish results of unsuccessful projects.
3. Conduct research into the conditions that lead to successful projects.

Local Governments

1. Commit to publication of research in your communities.
2. Commit resources to investigating public innovations

Conclusion and Next Steps

The workshop and listening sessions highlighted potential solutions to challenges integrating and scaling connected communities technologies. This report provides a potential path forward to funders, researchers, and community leaders to more effectively collaborate to achieve the promise of connected communities technologies. We encourage wide distribution of the findings of this report and hope that NSF will support turning these ideas into actions and invest in the promise of connected communities.

In the full report, we go into greater detail about background, methods, and findings of the workshop and listening sessions. We also provide detailed notes from the workshop and listening sessions in a Technical Appendix accompanying the report.